

CLAIMS

1. In a method for manufacturing a high silicon grain-oriented electrical steel sheet, comprising the steps
5 of: reheating and hot-rolling a steel slab to produce a hot-rolled steel sheet; annealing the hot-rolled sheet and cold rolling the annealed steel sheet so as to adjust a thickness of the steel sheet; decarburization annealing the cold rolled steel sheet; and finish-annealing the
10 decarburization annealed steel sheet for secondary recrystallization,

the improved method further comprising the step of: coating a powder coating agent for siliconization on a surface of the decarburization annealed steel sheet in a
15 slurry state, the powder coating agent including 100 part by weight of MgO powder and 0.5 - 120 part by weight of sintered powder of Fe-Si compound containing 25 - 70 wt% Si sintered powder, the sintered powder having a grain size of -325mesh;

20 drying the resultant decarburization annealed steel sheet; and

finish-annealing the steel sheet under a conventional condition.

25 2. The method according to claim 1, wherein the steel

sheet to be coated with the powder coating agent contains 2.9 - 3.3wt% Si with respect to the weight of the steel sheet.

5 3. The method according to claim 1, wherein the steel sheet to be coated with the powder coating agent comprising C: 0.045 - 0.062 wt%, Si: 2.9 - 3.3 wt%, Mn: 0.08 - 0.16 wt%, Al: 0.022 - 0.032 wt%, N: 0.006 - 0.008 wt%, remnant iron and inevitable impurity.

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 4. The method according to claim 1, wherein the Fe-Si-based sintered powder substantially comprises FeSi_2 , FeSi , Fe_5Si_3 or Fe_3Si , and comprises the sintered powder of $\text{FeSi}_2 + \text{FeSi}$ in excess of 90 wt% with respect to the weight of
15 the Fe-Si-based sintered powder.

 5. The method according to claim 1, wherein the steel sheet coated with the slurry is dried at a temperature range of 200 - 700 °C.

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 6. The method according to claim 1, wherein the dried steel sheet is heated up to a temperature of 1200 °C in a mixture gas atmosphere of nitrogen and hydrogen, and continuously uniformly heated at a temperature of 1200 °C,
25 in a 100% hydrogen atmosphere for 20 hours or more and

cooled.

7. The method according to claim 1, wherein the slurry is coated on the surface of the decarburizing annealed steel sheet so as to satisfy the following formulas 1 and 2:

$Y - 0.25 \leq \text{coated amount} \leq Y + 0.25$ ----formula 1, and

$Y(\text{g/m}^2) = 28(x_1 - x_2)/(A - 14.4)B = 0.8$ —formula 2,

where A is a Si content (%) in the Fe-Si-based sintered powder, B is a mixture ratio of Fe-Si-based powder contained in annealing separator composition, x_1 is a target Si content (%) of matrix material, and x_2 is an initial Si content of matrix material.

8. The method according to claim 1, wherein the dried steel sheet is heated at a 100% nitrogen atmosphere in a temperature elevating period of from heating start to 1100 °C to control Si content as siliconized below 0.25%, and is then heated in an atmosphere containing less than 10% nitrogen after 1100 °C where the secondary recrystallization is completed.